Therapy-resistant enuresis in adolescents, when sporting in the evening

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Introduction

Monosymptomatic nocturnal enuresis (MNE) is frequently related to nocturnal polyuria.

Desmopressin (dDAVP), a synthetic vasopressin analogue, is a level A, grade I treatment option in these children.

In the past years we observed 6 adolescents (3 cyclers + 3 footballers, 14-18 years) with MNE from sport schools, who had dDAVP-resistant nocturnal polyuria, especially on nights following evenings with intensive physical training. This contrasted with our initial idea that following sport and dehydration, they should have lower diuresis-volumes overnight.

Aim

To investigate pathophysiological mechanisms that might explain dDAVP therapy-resistance.

Method

24-hours urine collection with timed voidings was obtained, on a day with and without evening sport training. At least 30 to 60 minutes before sleeping, two tablets of 200 µg dDAVP was given. The use of sport drinks was avoided, but there was no absolute fluid restriction in the evening. However, fluid intake was obsolete after dDAVP intake until the next morning.

Results

Diuresis-rate overnight was in 6 of 6 patients higher on the sporting than on the non-sporting evening, mainly in the first 6 hours of the night (U5-U6) **(Fig.1).** This was associated with lower urinary osmolality **(Fig.2)** and higher osmotic and sodium excretion **(Fig.3).** 24-hours sodium and solute excretion was not different. However, on the sporting evening there was obvious a water-and sodium-retention during the evening urine collections.

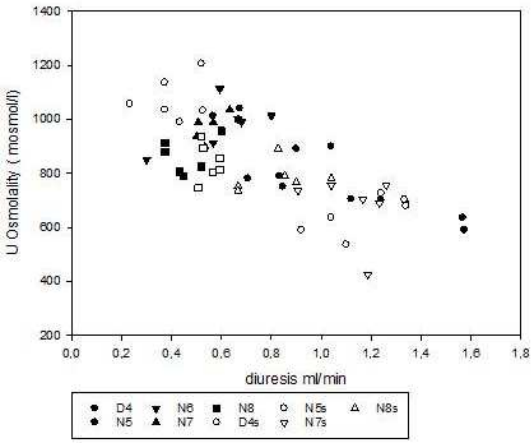

Fig.1: Correlation between urinary osmolality and diuresis volume as well in the days without sport D4 andN(5-8) as days with sport (D4S, N5-8s).

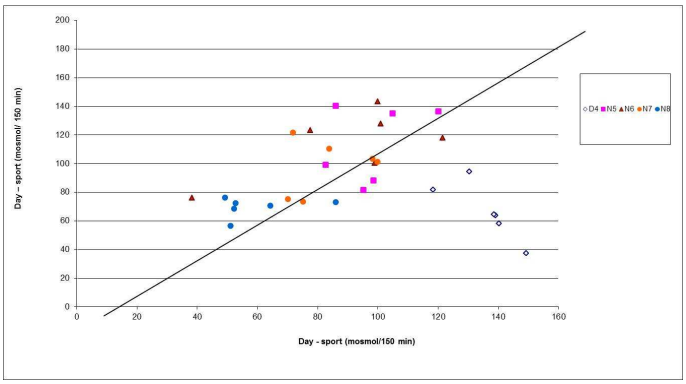

Fig.2: Osmotic excretion in the evening (during and after the sport) is significantly lower, reflecting avid solute (sodium retention) , what together with the water retention, is suggestive for functional hypovolemia induced compensatory retention. Especially during the first 2 night collections N5 and N6 have higher osmotic excretions, suggestive for compensatory excretion, post vasodillation.

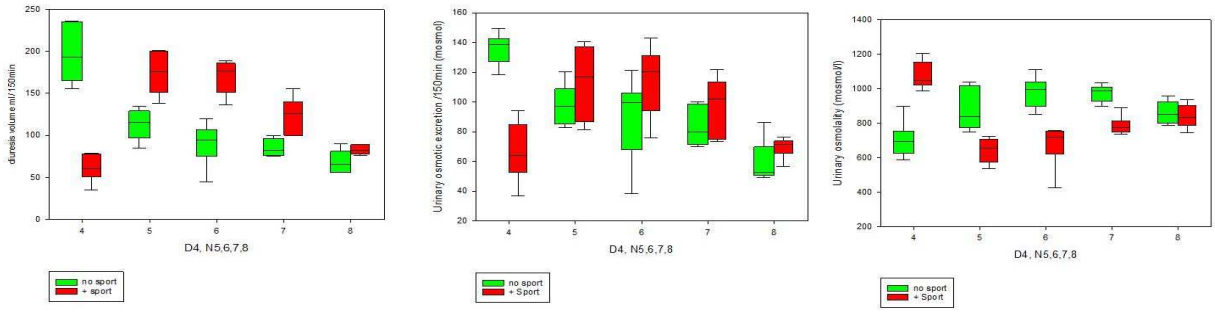

Fig.3: Fig 3 a, b, c present the diuresis rate, osmotic excretion and urinary osmolality on non-sporting days in comparison with sporting days. The evening collection, during and after the sport demonstrates lower osmotic excretion and diuresis volume, with higher urinary osmolality reflecting solute and water retention. This is suggestive for functional hypovolemia in relation to the vasodilation. Subsequently, this retained solute and water are excreted during the beginning of the night (N5 and N6).

Conclusion:

The observation suggests that during sport, the active water-and sodium-retention (secondary to the exercise) with associated vasodilatation and increase of vaso-active hormones, results in adaptive increase in body-fluid/bloodvolume. Once vasodilation regresses, a normalization of fluid/bloodvolume is induced in the first hours of the night, probably related to increased circulating blood volume. Since this is not only a water-driven but also solute diuresis, this patients will be more likely dDAVP-resistant.

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